I. INTRODUCTION

A. Purpose: To provide the minimum standards and safeguards for the construction, handling, and use of fireworks and equipment intended for an outdoor fireworks display by the consolidation of requirements within recognized standards.

B. Scope: This regulation shall apply to all pyrotechnic operators who desire to conduct such shows or displays within the jurisdiction of this Department.

C. Author: The Deputy Chief of the Prevention Services Bureau, through the Assistant Fire Chief (Fire Marshal) of the Fire Prevention Division, is responsible for the content, revision and periodic review of this regulation.

D. Authority:

1. Health and Safety Code (H.S.C.) of the State of California, commencing with Section 12500.

2. California Administrative Code, Title 19, Commencing with Section 975.

3. Los Angeles County Code, Title 32, Article 78

4. NFPA 1123, Fireworks Display, 2000 edition

II. RESPONSIBILITY

A. The Fire Prevention Division's regional battalion fire chief has the authority to issue fireworks permits and will ensure:

1. The period of the permit is defined and in no case shall it exceed the valid period of the license (H.S.C. 12642).

2. Findings and recommendations concerning the issuance of the permit be made after an investigation (H.S.C.12645).

3. The area for a public fireworks display is not hazardous to property or dangerous to any person (H.S.C. 12648).

4. The processing of the "Application for Permit--Public Fireworks Display," and the determination for the need of fire safety officers.

B. Fire station captains are responsible for the inspection, standby and follow-up at public fireworks displays when fire safety officers from the Fire Prevention Division are not required.

III. POLICY

A. Whenever a public display is conducted which involves the use of flammable and explosive devices, minimum safeguards must be met to ensure public safety. The Department will enforce this regulation whenever such displays take place.

B. When an outdoor fireworks display is to be conducted in the unincorporated area of Los Angeles County permission to conduct the show must be granted in writing from the Department of Regional Planning.

1. If the show is to be conducted in a Los Angeles County Park, permission shall be granted in writing by the Los Angeles County Parks and Recreation Department.

IV. PROCEDURES

A. The permit application for a "Public Fireworks Display" is required to be submitted to the Fire Prevention Division Headquarters in Commerce **14 days** prior to the proposed outdoor fireworks display (FC7801.3.1.4).

The permit application Form 444, "Application for Outdoor Fireworks Display" or a permit application from the pyrotechnic company will be accepted as long as it includes the following information:

1. Name of the organization sponsoring the display, together with the names and license numbers of the persons actually in charge of the display.

2. The date and time the display is to be held.

3. The exact location of the display.

4. The size and number of all fireworks to be discharged including the number of set pieces, shells, and other items. Shells shall be designated by diameter specifying single, multiple break or salute.

5. The manner and place of storage of all fireworks prior to, during, and after the display,

6. A site plan shall be attached to the application showing a diagram of the grounds on which the display is to be held. This diagram shall include, showing the point at which the fireworks are to be discharged, the location of all buildings, roads, and other means of transportation, the distance to lines behind which the audience will be restrained, the location of all nearby trees and flammable vegetation, telegraph or telephone lines, or other overhead obstructions.

7. Proof that satisfactory compensation insurance is carried for all employees.

8. Provide documentary proof of public liability and property damage insurance in conformance with 12610 and 12611, Health and Safety Code. Maximum deductible is $15,000.00.

9. A State Fire Marshal license for the public display of fireworks. No permit for a public display of any type shall be granted unless a public display (general, special, or limited) has been first obtained from the State Fire Marshal.

10. The name and license number of the wholesaler who supplied all items used in the display.

11. Permittees shall be responsible for compliance with the provisions under which a public display permit has been granted.

C. Inspections: All public fireworks displays shall be inspected by a member of this Department prior to conducting such events. Furthermore, the assigned Department member shall remain throughout the performance and for a sufficient time thereafter to ensure the safety of those in attendance and of the adjacent property.

1. A Fire Prevention Division battalion fire chief has been assigned to determine whether a fire safety officer will be required to inspect and standby during the display.

   a. If it is determined that the size and location of the show does not require a fire safety officer, the jurisdictional engine company will be notified by e-mail and through written channels. The engine company captain will then be responsible for the inspection, standby and fire safety of the public fireworks display.

D. Inspection Guidelines:

1. Pyrotechnic Operator--Must be at least 21 years of age and have a current “Basic Commercial” or “Unrestricted” pyrotechnic operator's license.

   a. There must be at least one additional experienced person present. No one under 18 years old shall be in the firing area or fireworks storage areas.

   b. Any person manually discharging aerial shells shall wear at a minimum a hard hat, eye protection, long sleeved shirt, gloves, long pants, and shoes or boots, and have ear protection available.

2. Confirmed or suspected use of alcohol or drugs shall be cause for immediate removal of an operator or assistant from his assigned duties even if it means the cancellation of the show or display.

3. The pyrotechnic operator shall employ monitors whose sole duty shall be the enforcement of crowd control around the display area. Unauthorized persons shall not be allowed to enter the discharge site until the site has been inspected after the display by the pyrotechnic operator (FC7802.4.9.3) NFPA 1123 5.1.4.2

4. Firing Site Protection--Once the fireworks have been delivered to the site, the site shall not be left unattended or allowed to become wet. Unauthorized persons and the public shall be kept a minimum of 50 feet from the fireworks.

5. Smoking material, matches, lighters or open flame devices shall not be allowed within 50 feet of any area where fireworks or other pyrotechnic materials are present.

6. Ready Boxes shall be a portable, weather resistant container that protects fireworks from burning debris. Shells delivered to the site shall be sorted and stored in Ready Boxes.

    a. During performances Ready Boxes shall be located upwind and a minimum of 25 feet from the discharge site.

7. If the fire safety officer or the pyrotechnic operator determines that there is a lack of crowd control or that the crowd is in danger, the display shall be immediately discontinued. At any time high winds or wet weather creates a danger, the display shall be postponed until the weather conditions are acceptable. (FC7802.4.9.4)

8. Recommended distance from spectators--The fireworks included in any display must be tailored to the available "free zone" which shall be devoid of spectators.

    a. Minimum mortar separation distances from spectator viewing areas, vehicles and buildings shall be **70’ for every inch of inside diameter of the mortar , but not less than 140’.**

    b. Low-Level Displays--Mines.

        (1) 150 feet in all directions.

    c. Ground pieces shall be located not less than 150’ from spectators and vehicles; not less than 100’ from tents, canopies or membrane structures; not less than 100 feet from mortars; and outside of the designated landing area.

        Note: Fixed ground pieces are allowed not less than 75 feet from spectators and vehicles. Electrically fired ground pieces are allowed in the designated landing area.

9. Distance from vulnerable areas: Spectators, vehicles and combustible materials shall not be allowed within the designated landing area. The designated landing area shall not be within 100' of tents, canopies or membrane structures.

10. Search of grounds after display: After the display, the grounds must be thoroughly searched for any fireworks that have been overlooked, misfired, or the components of which have failed to explode and have fallen to the ground.

    a. All components, which are explosive, are so labeled.

    b. Any misfired fireworks (one in which the fuse has been ignited and gone out) must not be approached for at least 15 minutes. Such shells shall then be doused with water, allowed to stand for not less than 5 minutes and placed in a bucket of water.

11. Fireworks display field inspection report: The Fire Prevention Division will furnish the fire safety officer or the jurisdictional engine captain with a Field Inspection Report--Form 441, which shall be completed and returned to Fire Prevention Division Headquarters.

E. Mortar Safeguards:

1. General:

    a. Prior to placement, mortars shall be inspected carefully for defects, such as dents, bent ends, damaged interiors, and damaged plugs. Defective mortars shall not be used.

    b. Electric firing shall be required for all mortars eight inches or greater.

    c. Multiple break shells that include a salute shall be fired in High Density Polyethylene (HDPE) Mortars only.

    d. All aerial shells greater than 6 in. diameter shall be preloaded and electrically fired whereas the shooter is a minimum 75 feet from the lift charge.

2. Steel Mortars:

    a. Steel mortars shall be constructed of commercially manufactured, first quality electric resistance (ERW) or drawn over mandrel (DOM) steel tubing conforming to ASTM Standard A135-83. Mortars constructed of cast iron, or other fragmenting types of steel and all other types of metal are prohibited.

    b. Steel mortars shall have a base plate the same thickness of the mortar wall, welded continuously around its perimeter.

    c. The inside length of steel mortars shall meet the specifications set forth in Appendix A.

d. Mortars shall not have any visible cracks in the body of the tube, nor any cracks or voids in the weld around the base plug. Mortars shall not be dented or distorted beyond the point that such distortion interferes with the smooth and unimpeded travel of the shell throughout the entire length of the mortar.

e. Steel mortars shall not be used to fire salutes.

3. Paper Mortars:

a. Reusable paper mortars shall be of spiral or convoluted wound craft paper or chipboard and shall meet the minimum specifications set in Appendix A.

b. Base plugs for paper mortars shall be wooden and securely glued, as well as nailed, screwed or bolted to the base of the mortar. Baser plugs shall be discarded and replaced when damaged. Minor cracks and checks are acceptable.

c. Paper Mortars shall not be used to fire multiple break-shells.

4. Mortar Placement:

a. Mortars shall be securely buried to a minimum of 2/3 to 3/4 of their minimum legal length in earth or in drums or troughs filled with moist earth or sand essentially free of debris.

b. Mortars shall be positioned so that aerial shells are directed over the designated landing area away from spectator viewing areas.

c. Mortars, other than metallic mortars, may be placed in wooden finale racks.

d. Planking below mortars shall be required when the base of the mortar, trough, or drum is not on a stable and level surface.

e. Placement and spacing of mortars in non-electrically fired shows shall meet the following:

(1) Mortars up to five inches in diameter that are buried in earth or placed in troughs or drums shall be spaced a minimum of 3 inches apart from the sides of the drum or trough.

(2) Mortars six inches or larger in diameter that are buried in earth or placed in troughs or drums shall be spaced a minimum of 5 inches apart.

Note: When a mortar requiring 5 inches of space is placed adjacent to a mortar requiring 3 inches of space, the larger spacing shall apply.

f. Placement and spacing of mortars in electrically fired shows shall meet the following:

(1) Mortars buried in earth or placed in troughs or drums shall be normally spaced 2 inches apart or from the sides of the drum or trough.

(2) Mortars shall be set in a stable and secure manner so that any accidental impacts and shell discharges will not change the trajectory of adjacent unfired shells.

5. Mortar Racks:

a. Mortar racks shall be limited to a maximum of 10 tubes per unit.

b. Single break shells not exceeding 6 inches in diameter shall be permitted to be fired from securely positioned mortar racks.

c. Firing of single break shells that are 7 inch or 8 inch in diameter shall be permitted to be fired from securely positioned mortar racks provided the following conditions are met:

(1) The mortar is not metallic.

(2) Electrical or equivalent means of remote ignition is used to fire the shell.

(3) The shell is not chain fused to any other shells.

d. Base ends of rack shall be a nominal 2” thick lumber.

e. Inside width shall be equal to the outside diameter of the mortar tube.

f. Each mortar tube shall be separated by horizontal or vertical blocks nominally 2” thick and 4” wide.

g. Side braces for mortar racks of 3-inch size mortars and up shall be 1” x 6” nominal lumber or ½” x 4” plywood, securely fastened by nails, screws, or attached with construction grade staples.

h. A diagonal side brace must be employed on all mortar racks with more than 5 mortar tubes.

i. Mortar racks shall not incorporate steel brackets or other metallic parts in their construction with exception of nails, screws, or construction-grade staples.

6. Specification of troughs:

a. Troughs shall not be more than 8 feet in length.

b. Troughs shall be reinforced or braced in a minimum of 2 places on the sides at intervals no greater than 4 feet.

c. The sides, bottom and ends of troughs shall be minimum ¾-inch plywood or nominal 2-inch lumber. If the surface at the bottom of the trough is sufficiently stable to support the firing of the mortar, no bottom is required.

d. Troughs shall be secured by a minimum 3/8-inch through-bolts, rods or angle iron "U" brackets at each end and center to prevent bulging.

e. Troughs may be placed in a continuous row provided they are stable and secure.

F. Aerial Shells:

1. Aerial shells are those shells that begin to discharge their effect when they reach their designated altitude. Aerial shells are designed with:

a. A lift charge.

b. A timing fuse to delay the effect.

c. A bursting charge to open the shell casing and ignite the effect.

2. The trajectory of aerial shells shall be arranged such that a minimum clearance of 25 feet is maintained from potential obstructions.

3. Ready boxes shall be located not less than 25 feet in an upwind direction from the mortars.

4. The designated landing area shall be an approved large, clear, open area. Spectators, vehicles and combustible materials shall not be allowed within the designated landing area. The designated landing area shall not be within 100 feet of tents canopies and membrane structures.

G. Ground-Level Fireworks:

1. Selecting the site--ground-level displays of fireworks must be sited at least 150 feet from spectators and vehicles, or at a greater distance stipulated by the authority having jurisdiction. The area beneath ground pieces shall be free of dry grass and combustibles. To prevent premature ignition, ground pieces should be spaced about 25 feet apart.

2. Placement of Various Ground-Level Fireworks:

a. Wheels--Wheels are mounted on vertical poles at the height recommended by the manufacturer. An easy way to erect the poles is to drive a stake firmly into the ground and then lash the pole to it as

illustrated in Figure 6. Before erecting, ensure that the wheel will turn freely in the correct horizontal or vertical position and that the string bunching the fuse is cut, allowing it to hang down. The fuse should then be tied to the pole so that it is easily accessible.

b. Waterfalls--Waterfalls are mounted between two poles set at the height and distance recommended by the manufacturer. After mounting, the loose end of the fuse should be tied to one of the poles.

c. Illuminations--The flares to provide the illumination are laid on the ground behind trees or shrubs and should not be in the direct line vision of the spectator.

d. Set Pieces--Set pieces must be firmly attached to poles according to the manufacturer's instructions. They must be securely braced and guyed to prevent accidental displacement. The fuse should be tied to the pole to assure easy ignition.

e. Pigeons--Pigeons or similar flying devices must have controlled flight and must be so installed as to prevent flight in the direction of spectators if accidentally released during flight.

H. Malfunction Terminology:

1. Detonation--The most serious of all malfunctions. The entire shell's contents and the lifting charge explode simultaneously at the bottom of the mortar. Do not confuse detonation with a Flower Pot or Mine because there is no shower of stars or burning material and the entire shell and its contents are consumed within the mortar in an instantaneous explosion which frequently disturbs the position of adjoining mortars.

   a. Causes--Generally a defect in manufacturing. In some instances, it is caused by a shock wave striking the shell following the explosion of an excessive amount of lifting charge.

2. Dud--The shell leaves the mortar, but fails to break or burst and falls to the ground. It may fire upon hitting the ground.

   a. Causes--The failure of the time fuse to ignite, or the fuse ignites but is extinguished before igniting the bursting charge.

3. Flower Pot or Mine--Only the shell, but not the lifting charge, explodes at or near the bottom of the mortar blowing a shower of stars and burning material into the air.

   a. Causes--Usually caused by a faulty time fuse. Also damaged shell casings will cause pre-ignition of the star shell compartment. Other causes stem from an inadequate amount of lift charge or the charge is missing entirely. This could happen during shipping and handling.

4. Low Burst or Low Break--The shell explodes below the prescribed height on the way up or the way down.

a. Causes--Usually caused by a defective or malfunctioning time fuse. The size of the timing device could be too long or too short, or the fuse housing may have been damaged causing an accelerated burning rate.

b. Other possible causes are the loading of shells into too large of mortars or into mortars partially filled with debris from previous firings; or the shell was improperly loaded causing the shell to be "hung-up" in the mortar.

5. Misfire--The quick match burns away after being lighted and nothing else happens.

a. Causes--Normally due to faulty manufacturing of the quick-match. The quick-match may be damaged by moisture or it could be partially pulled out of the shell as a result of mishandling during removal from the field magazine or during reloading.

6. Muzzle Burst--The shell bursts just as it leaves the mortar, scattering stars and burning material in all directions.

a. Causes--A malfunction in the time fuse or by a damaged shell casing.

I. Floating Vessels and Floating Platforms (Barge Displays)

1. Floating vessels and floating platforms shall be permitted to be manned or unmanned as long as the pyrotechnic crew remains in control of the site and firing of the display.

2. The minimum size for the floating vessel or floating platform for electrically fired programs that are staffed shall be based upon the area for the setup of the display plus the area for the safety shelter. The minimum specifications for these two areas shall be defined by the following formula:

$$\text{Minimum display setup area } (ft^2) = \sum \frac{M_n \times D_n}{2}$$

where:

M_n = number of each different mortar size 1 to n

D_n = inside diameter (in inches) for each different size mortar

<u>Exception #1:</u> Multishot devices up to 3 in. in diameter shall be calculated at twice the actual footprint of each device

<u>Exception #2:</u> Ground display pieces shall be excluded from the calculations for minimum display setup area.

3. The types of fireworks and placement of the fireworks launch tubes and accompanying equipment shall be such that, when fired, the stability of the site structures and seaworthiness of the floating vessels or platforms shall not be jeopardized.

4. Floating vessels that are staffed during electrical firing shall have a safety shelter. The safety shelter shall meet the following requirements.

    a. Be of sufficient size to accommodate all personnel present during the actual firing of the display.

    b. Have a minimum of 3 sides and a roof.

    c. Have walls and a roof constructed of at lest ¾ inch plywood or equivalent material.

    d. Separation between mortars and safety shelter shall be 2 ft/in of diameter of any mortars up to 6 inch in diameter; the minimum separation distance shall be 4ft/in of shell diameter.

5. At all times a minimum of two separate egress paths shall be provided. Only one egress path shall be required from protective barricades or safety shelters. Egress paths shall be unobstructed.

6. Manual firing of displays shall be permitted on floating vessels and floating platforms under the following conditions:

    a. All shells shall be preloaded into mortars prior to the display.

    b. All shells be limited to single-break and shall not exceed 6 inch in diameter.

    c. The minimum size of the floating vessel or platform shall be twice that required for an electrically fired display.

    d. A protective barrier meeting the strength requirements of ¾" plywood or equivalent shall be provided. All personnel other than the shooter and operator shall be behind the barrier during the display.

7. A US Coast Guard approved personal floatation device shall be provided and available for each person on a display launched from floating vessels and floating platforms. Those PFD's shall be properly worn any time the vessels is not moored at the dock. PFD's shall have or include a visual location device.

8. A watercraft ready and capable of providing rapid emergency response shall be present during the display.

9. An operational means of communication, such as a cellular phone, marine radio, or walkie-talkie system shall be on board staffed vessels and platforms from which fireworks are being discharged.

10. The Lifeguard Division shall be notified and will provide a safe area clear of marine craft and other hazards under the fall-out zone and surrounding the floating platform or vessel. Fire Safety Officer Fees may be required for the Lifeguard safety officers.

APPENDIX A

MORTAR SIZES

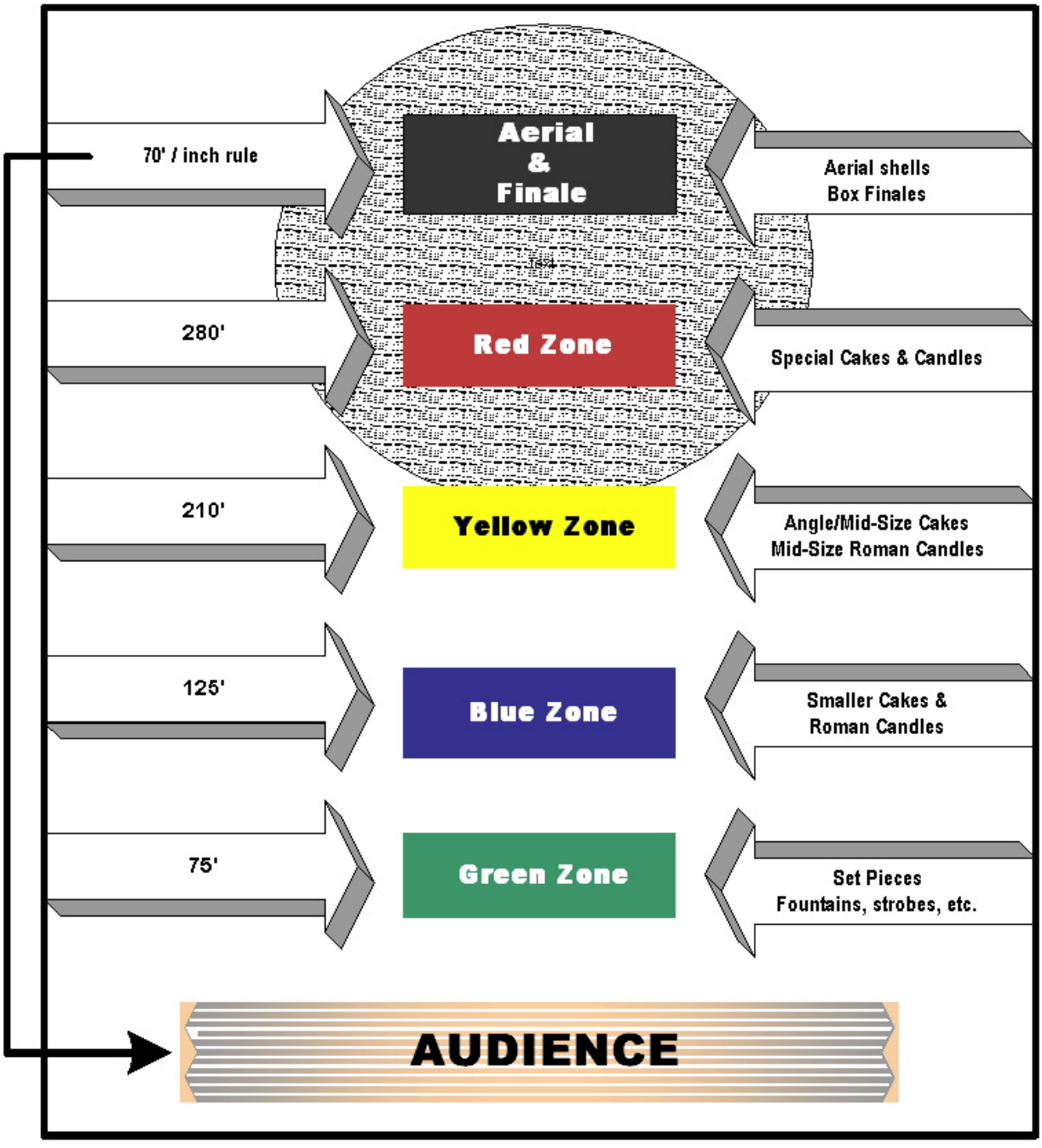
Shell Size	Inside Length Steel Mortars	Inside Length Paper Mortars	Inside Length HDPE Mortars
1.99” or less	8 inches	8 inches	10 inches
2 inches	13 inches	13 inches	13 inches
2 ½ inches	13 inches	13 inches	13 inches
3 inches	15 inches	15 inches	15 inches
4 inches	20 inches	20 inches	20 inches
5 inches	25 inches	25 inches	25 inches
6 inches	30 inches	30 inches	30 inches
7 inches	32 inches	32 inches	32 inches
8 inches	32 inches	32 inches	32 inches
10 inches	40 inches	-	-
12 inches	40 inches	-	-
16 inches	64 inches	-	-
24 inches	96 inches	-	-

APPENDIX B

RECOMMENDATION FOR MINIMUM RADIUS OF DISPLAY SITES FOR OUTDOOR FIREWORKS DISPLAYS BASED UPON NFPA 1123 GUIDELINES

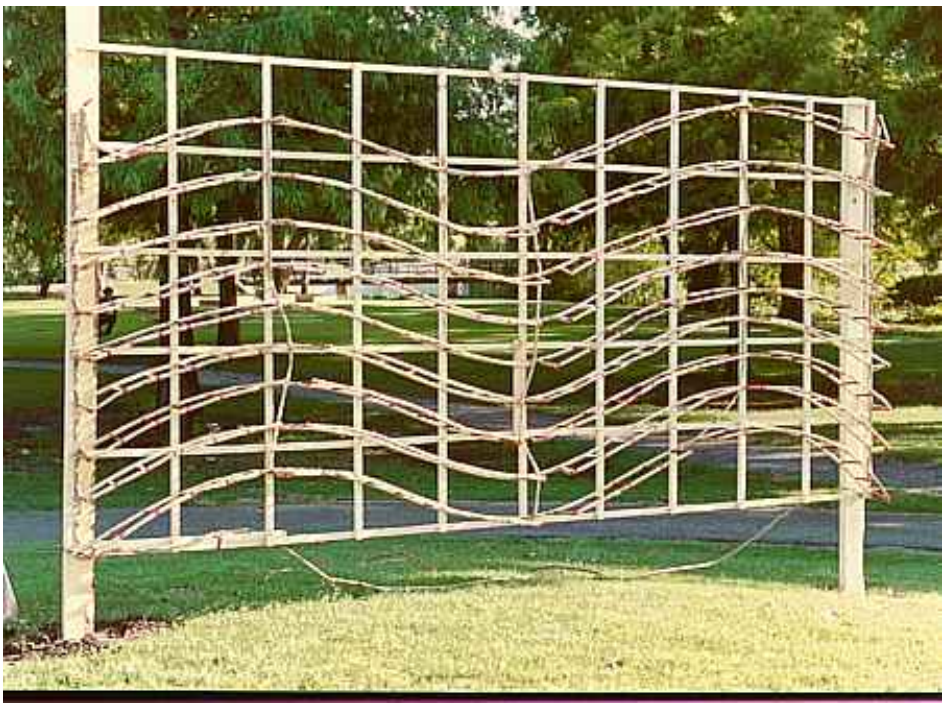
Shell Size	Minimum Radius of Display Site
<3 inches	140 feet
3 inches	210 feet
4 inches	280 feet
5 inches	350 feet
6 inches	420 feet
7 inches	490 feet
8 inches	560 feet
10 inches	700 feet
12 inches	840 feet
> 12 inches	AHJ approval

SAFE ZONES



Recommended minimum safe distances from the audience where pyrotechnic devices should be placed for outdoor aerial displays. **Note**: Performance criteria of device and site characteristics will determine zone placement - ALWAYS place device according to the label. *Rev*: 5-30-00

FINALE



FIXED SET PIECE

FILLING MORTARS

MORTAR COVERED – DRY – WITH FUSE